DECLASSIFIED
D... March 1994
AUT... X

THE PREPARATION OF ELEVEN ELECTROLYTIC BATH REFERENCE MATERIALS FROM ALCAN INTERNATIONAL LIMITED, ARVIDA LABORATORIES

C.W. Smith, P. Westra and D.E. McIntosh
CCRMP Facility, Chemical Laboratory

July 1986

Project: 30.69.01
Reference Materials
30.69.99
Cost Recovery

Job No. 02567

17 pp

MINERAL SCIENCES LABORATORIES
DIVISION REPORT MSL 86-13 (CR)

CONFIDENTIAL

MICROMEDIA

91-04940/

THE PREPARATION OF ELEVEN ELECTROLYTIC BATH REFERENCE MATERIALS FROM ALCAN INTERNATIONAL LIMITED, ARVIDA LABORATORIES

by

C.W. Smith, P. Westra and D.E. McIntosh

ABSTRACT

Eleven solid samples from aluminum ore processing, described as electrolytic bath samples, were prepared for use as reference materials at the Canadian Certified Reference Materials Project facilities of the Mineral Sciences Laboratories.

The samples were comminuted to minus 83 µm particle size, blended and bottled in 100 g units. Some 2900 units were produced and returned to Alcan in August 1986.

This work was carried out by CANMET under a cost recovery arrangement with Alcan. This report documents the technical preparation for Alcan.

INTRODUCTION

In April 1986, Alcan International Limited, Arvida Laboratories requested that the Mineral Sciences Laboratories prepare eleven reference materials for an internal Alcan program. These were described as solid powder "electrolytic bath" samples comprised of a set of five with lithium additives and a set of six without additives.

This request and the subsequent arrangements paralleled those for a previous cooperative arrangement between Alcan and CANMET which was completed successfully in February 1986, and is described in CANMET Report MSL-INT 86-6 (TR). In that project six electrolytic bath reference materials were prepared at the CCRMP preparative facilities of the Chemical Laboratory under a cost-recovery arrangement.

The letter of request and subsequent letter of agreement between Alcan and CANMET for the present project comprise the Appendix to this report.

The samples were received on 21 May 1986 and delivered to Alcan on 12 August 1986,completing the project.

PREPARATIVE REQUIREMENTS

The preparative requirements are documented in detail in the Appendix. Briefly, each sample was to be sieved through a 180 mesh stainless steel wire cloth (83 µm), the oversize was to be ground to minus 83 µm (for approximately 100% recovery) and combined with the undersize. Each sample was to be blended in a single lot for approximately 16 h and then bottled in 100-g units in 250 mL* Nalgene® bottles. It was emphasized that sample cross contamination was to be avoided, in particular between the sets with and without lithium additives.

PREPARATIVE TECHNOLOGY

Each material was passed through a 83 µm (180 mesh) stainless steel screen employing a Russel Finex mechanical siever. The undersize fraction, which was typically ninety per cent or more of the material, was stored in a labelled clean plastic pail. The oversize fraction (3 Kg or less) was stored in a labelled plastic tub for subsequent communition.

The oversize fractions were comminuted by passing them through a Denver pulverizer. The pass diameter was adjusted to effect grinding with a minimum of heat generation. The pulverized material was passed through the sieving operation and the undersize combined with the original undersize fraction. If a significant fraction of oversize remained, a second communitional sieve cycle was carried out.

---

*Subsequently revised to 125 mL bottles.

The combined undersize of each material was transferred in one lot to a 540 L capacity cone blender and tumbled for six to fourteen hours*. The reference sample was then bottled in labelled 125 mL capacity Nalgene® bottles in 100-105 g units. Bottling was accomplished by hand-loading due to the clogging properties of the materials in the mechanical bottle filter. The bottles were tightly capped and packed in boxes for shipment to Alcan.

It should be noted that between each of the above technical operations the relevant equipment was meticulously cleaned to prevent any cross-contamination. In addition, samples with lithium additives were processed in a sequence following those without additives.

It is further noted that there was an interruption between the sieving/communition and blending/bottling stages of processing. During the interim, the samples were stored in sealed plastic pails. The interruption was due in part to a delay in receiving the bottles, and alternative staff commitments as understood by Alcan at the project start.

Processing parameters for each material are summarized in Table 1.

The samples were packed and banded on pellets for shipment to Arvida on 12 August 1986 via Brazeau Transport.

---

*Deviation from original specifications was effected with Alcan permission.

Table 1. Preparation parameters for Alcan electrolytic bath reference materials

Reference Material	Wt. Received, Kg	Oversize (+83 μm), Kg		Blend Time, h	No. bottles (100-105 g)
		Pre-comminution	Post communition*		
Bath 07	30.6	3.2	0.34	14	281
Bath 08	25.6	2.0	0.19	14	240
Bath 09	37.2	0.68	information lost	14	345
Bath 10	32.7	0.68	0.30	6	304
Bath 11	16.3	0.23	0.15	14	153
Bath 12	34.7	0.35	0.22	6	327
Bath 13	25.6	0.23	0.12	14	243
Bath 14	25.9	0.23	0.11	6	246
Bath 15	23.8	0.11	0.11**	14	227
Bath 16	47.2	0.23	0.09	14	450
Bath 17	19.0	0.23	0.09	6	189

*rejected
**no comminution

EFFORT DISTRIBUTION

A summary of effort distribution on this project is provided in Table 2.

Table 2. Effort distribution, MSL Cost Recovery
Job No. 025217

Participant	Classification	Nature of Effort	Hours
C.W. Smith	SE-RES-02	Project coordination, reporting	10.
P. Westra	GL-PRW-8	Hiring, technical supervision, assistance, logistics	32.
D.E. McIntosh	GL-MOC-7	Preparative assistance, shipment packing	24.
D. Sopher	temporary labourer*	Preparative labour	121.
D. Moore	temporary labourer*	Preparative labour	112.

*Contract employees of Alcan Canada Limited.

APPENDIX

- Letter of Request

- Letter of Agreement

Alcan International Limitée
Laboratoires Arvida et Centre de génie expérimental

Adresse postale: C.P. 1250, Jonquière (Québec), Canada G7S 4K8
Téléphone: 418/548-1121 Télex: 05-25236

8 April 1986

Dr. Clinton W. Smith
Acting Coordinator
Canada Centre for Mineral and Energy Technology
555 Booth Street
Ottawa, Ontario
K1A 0G1

Re: Preparation of Electrolytic Bath Samples

Dear Dr. Smith,

As discussed in our telephone conversation of 7 April 1986, we would like to conduct a similar project as already performed in 1985 with CANMET.

The requirements for the present project are described in Table 1.

We would appreciate receiving a quotation regarding possible costs involved in CANMET facility and staff supervision as mentioned in your letter dated 27 March 1986.

If CANMET preparation facilities are made available to Alcan, we would also be pleased to agree with the arrangements previously described in your letter dated 6 November 1985 (i.e.: temporary employee, bottles, labels, shipping, etc. at Alcan's expenses).

Thank you for your cooperation and for your reply to this request.

Best regards,

G.F. Giasson,
Analytical Services
Coordinator

GFG/ed

Copies to: Mr. C. Brisson
Dr. F. Kimmerle

Canada Centre for Mineral and Energy Technology
Dr. L.L. Sirois

TABLE 1

REQUIREMENTS FOR SAMPLE PREPARATION

1. Samples: 11 baths samples already ground approximately to -150 mesh.

   6 baths without additives

   CAA (34 kg), CAB (30 kg), CAC (42 kg)
   CBA (16 kg), CCS (36 kg), CCG (18 kg)

   5 baths with lithium additives

   CCM (26 kg), CCT (47 kg), CCF (34 kg)
   CCO (25 kg), CCU (21 kg)

2. Screening: Screen each sample to -180 mesh and regrind oversize to ~ 100% -180 mesh.

3. Blending: Blend each sample for ~ 16 hours.

4. Bottling: Portion of 100 g in 250 mL plastic bottle.

5. Labeling: Fix a label on each bottle.

6. Shipping: Pack in labeled boxes (~ 90 bottles/box).

Energy, Mines and Resources Canada
Research and Technology
Canada Centre for Mineral and Energy Technology,
555 Booth Street
Ottawa, Ontario
K1A 0G1

Énergie, Mines et Ressources Canada
Recherche et technologie
Centre canadien de la technologie des minéraux et de l'énergie,
555, rue Booth,
Ottawa (Ontario)
K1A 0G1

Your file Votre référence

Our file Notre référence

1 May 1986

Dr. G.F. Giasson,
Coordinator of Analytical Services,
Alcan International Limited,
Arvida Laboratories and Engineering
Research Centre,
C.P. 1250,
Jonquière, Québec,
G7S 4K8

Dear Dr. Giasson:

With respect to your request for a cost quotation for the preparation of eleven electrolytic bath reference samples as described in your letter of 8 April 1986 to Dr. C.W. Smith, please be advised that our estimate of costs to CANMET is $2742.92.

This estimate includes the costs of staff time and supplies as estimated in Annex A. This estimate is exclusive of costs for supplies and services that would be borne directly by Alcan: sample bottles and labels, shipping charges, and services of a temporary employee to perform the preparative and packaging labour.

The labour time to perform the work defined in Table 1 of your letter is estimated at 265.5 hours (6.6 working weeks), as detailed in Annex B. The actual time required may vary depending on the properties of the samples and the efficiency of the labour. The qualifications of a suitable temporary employee are outlined in Annex C. As previously described, the responsibility to ensure adequate insurance protection for the temporary employee while working at CANMET would rest with Alcan and/or its contracted agency. CANMET would regard the employee as a permitted external visitor, and require him to sign a release of CANMET from injury liability.

.../2

However, CCRMP personnel would undertake to interview, select, initially train and generally supervise the employee upon Alcan's instructions, as in the previous arrangement of earlier this year. (This work and suitable work equipment for the employee are covered in the estimate Annex A).

The duration of the work requested, i.e. about 7 working weeks, creates some scheduling difficulties for the use of our facilities. If a continuous preparative segment is essential we would propose the period August 4 to (estimated) September 19, 1986. We would instead prefer that the project be conducted with an option for interruptions at CANMET's discretion, to accommodate a high-priority CANMET project.

We would anticipate at most two interruptions, possibly of two weeks duration each. Should interruptions occur, they would necessitate a layoff of the Alcan temporary employee, and possible retraining of a new man upon restart, at no additional cost to Alcan. We would therefore suggest a per diem contract arrangement with the temporary employee. The interruption(s) would be scheduled at the completion of preparation of a given Alcan sample. (Unfortunately we cannot be specific as to the anticipated interruption dates as they are dependent upon arrival of a sample at CANMET, which is unpredictable at this point). Given this latitude, we could begin the Alcan project by May 12, 1986.

With respect to the technical requirements of Table 1 of your letter of April 8, we would anticipate no difficulties assuming that the grinding properties are similar to the previous sample prepared in January. The labour time estimate was based on one oversize regrind, and rejection of any oversize remaining after this, as was indicated by you to be acceptable in our phone conversation of 25 April. Work will be performed as per your Table 1, however, the responsibility for ensuring acceptable homogeneity of the products rests with Alcan.

We hope these arrangements will be acceptable to you. Please confirm that this meets your requirements by signing the statement at the bottom of this letter and returning a copy to me.

Yours truly,

L.L. Sirois,
Director,
Mineral Sciences Laboratories.

I agree that the work and associated costs proposed by CANMET in this Letter of Agreement respond to the work detailed in the attached Table 1.

_____ Date

_____ for Alcan International Limited

c.c. L. Desrochers
C.W. Smith

TABLE 1

REQUIREMENTS FOR SAMPLE PREPARATION

1.	Samples:	11 baths samples already ground approximately to -150 mesh. 6 baths without additives CAA (34 kg), CAB (30 kg), CAC (42 kg) CBA (16 kg), CCS (36 kg), CCG (18 kg) 5 baths with lithium additives CCM (26 kg), CCT (47 kg), CCF (34 kg) CCO (25 kg), CCU (21 kg)
2.	Screening:	Screen each sample to -180 mesh and regrind oversize to ∿100% -180 mesh.
3.	Blending:	Blend each sample for ∿16 hours.
4.	Bottling:	Portion of 100 g in 250 mL plastic bottle.
5.	Labelling:	Fix a lable on each bottle.
6.	Shipping:	Pack in labeled boxes (∿90 bottles/box).

ANNEX A

Estimation of CANMET costs, Alcan cost recovery proposal

Reference: Letter from G.F. Giasson to C.W. Smith dated 8 April/86

1. Cost estimate, CANMET personnel	Hours	Cost
C.W. Smith, SE-RES-2, Project Coordination, reporting	10	$ 877.00
P. Westra, PRW-8, Technical Supervision, hiring adminstration	15	543.15
D.G. McIntosh, MOC-7, Training, technical supervision, manual assistance	35	1139.95
Sub-total		$2560.10

2. Cost estimate, supply purchases

Quantity		Cost
1	180 mesh screen, stainless steel, 24" diameter	$ 100.44
8	Disposable coveralls @ $6.65	53.20
40	Non-toxic particle masks @ $0.47	18.80
16	E.A.R. plugs @ $0.48	7.68
2	pairs gloves @ $1.35	2.70
	Sub-total	$ 182.82

Total esimate of costs to CANMET $2742.92

ANNEX B

Estimation of Labour Hours, Alcan Proposal of 8 April 1986

Reference: Letter from G.F. Giasson to C.W. Smith dated 8 April/86

Per sample:	Labour Hours
Screen separation of -180 mesh material	6.
Ball milling oversize (1 charge) plus rescreening*	4.
Clean-up time (ball mill, siever)	1.
Blending (loading, unloading, clean-up)	1.5
Bottle labelling, bottle filling, clean-up	11.
Packing for dispatch	1.
Total labour hours per sample:	24.5
Total labour hours @ eleven samples:	269.5 hrs.
or	33.7 days @ 8 hours

Above is an estimate only, based on available information.

It is assumed that Alcan would contract directly with an Ottawa labour source suitable for the work at CANMET.

It is advisable that a per diem contract arrangement be made as time required to actually do the work could vary considerably.

* As indicated in phone conversation of 25 April, residual oversize following one grind of the +180 mesh material would be discarded.

ANNEX C

Temporary Labour Requirement

Location:	555 Booth Street, Ottawa
Duration:	Up to 270 hrs (7 weeks) with possible interruptions in work of two 2 week periods.
Duties:	Eleven ore-type samples will be comminuted in a ball mill, screened, blended, bottled, labelled and packaged. The person hired will be required to load, unload, operate and clean the associated equipment without constant supervision. Duties involve manually lifting and moving materials up to 27 kg in mass and larger quantities with appropriate handtrucks. Approximately 3300 bottles must be labelled and filled. As the samples are for reference purposes, all operations must be performed conscientiously to avoid cross-contamination.
Qualifications:	The person hired must be sufficiently robust to perform the manual labour outlined above. Additionally, experience in working safely with heavy equipment with moving parts is required; previous experience as a machine operator is preferable. Initial training and safety orientation for each aspect will be provided. Following this training, supervision will not be constant. The person hired must be willing to conscientiously follow instructions.